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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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Daniel R. Gaur

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07/26/2006

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EXAMINER

ZHEN, LI B

ART UNIT

PAPER NUMBER

2194

DATE MAILED: 07/26/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/823,155

Applicant(s)

GAUR ET AL.

Examiner

Li B. Zhen

Art Unit

2194

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 May 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,6,7,15,18-20,25,26,31 and 34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,6,7,15,18-20,25,26,31 and 34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.

- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.


WILLIAM THOMSON
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100

DETAILED ACTION

1. Claims 1,6,7,15,18-20,25,26,31 and 34 are pending in the application.

Response to Arguments

2. Applicant's arguments with respect to the claims have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1,6,7,15,18-20,25,26,31 and 34 rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,772,189 to Asselin in view of U.S.

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Patent No. 6,470,397 to Shah et al. [hereinafter referred to as Shah, both cited in the previous office action], further in view of “Porting a User-Level Communication Architecture to NT: Experiences and Performace” [hereinafter Chen].

6. As to claim 1, Asselin teaches the invention substantially as claimed including a computer-implemented method comprising:

requesting a first deferred procedure call for a first interrupt event [ISR queues a work item on a selected work list and then queues a selected DPC by calling KeInsertQueueDpc() with a parameter corresponding to a DPC object that has been created; col. 5, lines 50 – 67];

requesting at least one other deferred procedure call for a second interrupt event associated with the source [When 4 the counter is incremented from 7 to 8, after using WorkList[7], the next work item will be placed on WorkList[0] again and so forth. When the counter rolls over, the WorkList[7] to WorkList[0] sequence will be maintained, since the number of work lists in the useable subset of DPC objects and associated work lists is a power of two; col. 6, line 59 – col. 7, line 19], wherein the first interrupt event comprises one type [DPC routine handles requests, command completions, and external communication responses for all of the devices supported by the interrupt; col. 2, lines 38 – 50] of event and the second interrupt event comprises another type of event [interrupt service routines in device drivers also have a DPC (Deferred Procedure Call) object and work list associated with the interrupt; col. 5, lines 38 – 50];

assigning the first deferred procedure call [associated DPC object is queued on the system DPC queue (step 36)...queuing is repeated in a round-robin fashion for every work item that needs to be performed; col. 7, lines 27 – 35];

processing the first interrupt event with the first deferred procedure call [kernel removes the DPC object from the queue (step 40), and calls the DPC routine associated with the DPC object (step 42); col. 7, lines 43 – 60]; and

processing the second interrupt event with the at least one other deferred procedure call [DPC routine removes and processes each work item from the work list, leaving the work list empty (step 44 and decision 45); col. 7, lines 43 – 60].

Although Asselin teaches the invention substantially as claimed, Asselin does not specifically teach processing each interrupt event with a different deferred procedure call.

However, Shah teaches a driver architecture supported by a variety of routines, including a interrupt DPC routine [col. 9, lines 16 – 23] and processing each interrupt event with a different deferred procedure call [send DPC routine is scheduled by the Send Callback routine upon the stoppage of the send queue resulting from a shortage of send buffers....receive DPC routine is scheduled by the Receive Callback routine after queuing an incoming data packet; col. 15, lines 5 – 38].

It would have been obvious to a person of ordinary skill in the art at the time of the invention was made to apply the teaching of processing each interrupt event with a different deferred procedure call as taught by Shah to the invention of Asselin because this provides a system for running network and storage protocols over the same

communication link, reduces the number of interface cards, interface circuits, and communication links, which provides for reduced costs and smaller system as compared with conventional systems [col. 3, line 65 – col. 4, line 7 of Shah].

Asselin as modified by Shah does not specifically teach assigning deferred procedure calls to individual threads of a processor supporting a number of threads of execution and concurrently processing the first and second events with corresponding threads.

However, Chen teaches assigning a first deferred procedure call [DPC] to a first thread [notification thread] of a processor supporting a number of threads of execution [a Deferred Procedure Call or DPC handler triggers an NT event on which a dedicated notification thread is waiting; p. 3, Section 3.2], assigning a second deferred procedure call [DPC] to a second thread of a processor supporting a number of threads of execution [a dedicated notification; examiner notes that there is a dedicated notification thread for each deferred procedure call, therefore, each DPC is assigned to a notification thread], concurrently processing the first interrupt event on the first thread and the second interrupt event on the second thread [multithreaded applications, p. 3, Section 3.2; examiner notes that multithreaded applications allows multiple threads to execute concurrently; Chen also teaches multiprogramming environment, which allows multiple operations to take place, p. 2, Section 2].

It would have been obvious to a person of ordinary skill in the art at the time of the invention was made to apply the teaching of assigning a first deferred procedure call to a first thread, assigning a second deferred procedure call to a second thread of a

processor supporting a number of threads of execution, and concurrently processing the first interrupt event on the first thread and the second interrupt event on the second thread as taught by Chen to the invention of Asselin and Shah because this allows a thread to wait on a event explicitly and this is a useful feature for multi-threaded applications because each thread can explicitly wait on its own messages [p. 3, right column, 4th paragraph of Chen].

7. As to claim 6, Asselin as modified teaches at least one of the first interrupt event and the second interrupt event comprises a software interrupt [NT event; p. 3, Section 3.2 of Chen].

8. As to claim 7, Asselin teaches a third interrupt event associated with the source with the first deferred procedure call, the third interrupt event comprising a third type of event [DPC routine handles requests, command completions, and external communication responses for all of the devices supported by the interrupt; col. 2, lines 38 – 50].

9. As to claim 15, Asselin as modified teaches a computer system comprising:
a driver [device driver 64, Fig. 3; col. 5, lines 9 – 50 of Asselin] stored in a memory of the computer system, the driver including an interrupt handler [interrupt handling services; col. 3, lines 47 – 56 of Asselin] to identify interrupt events [col. 3, lines 26 – 33 of Asselin];

a first deferred procedure call, the first deferred procedure call to process a first type of the interrupt events [col. 5, lines 50 – 67 of Asselin]; and

a second different deferred procedure call [col. 12, line 51 - col. 13, lines 30 of Shah], second deferred procedure call to process a second type of the interrupt events [col. 6, line 59 – col. 7, line 19 of Asselin]; and

a processor supporting a number of threads of execution [multiprogramming environment, p. 2, Section 2 of Chen], the processor to concurrently execute the first deferred procedure call on a first thread [a Deferred Procedure Call or DPC handler triggers an NT event on which a dedicated notification thread is waiting; p. 3, Section 3.2 of Chen] of the number of threads and the second deferred procedure call on the second thread [a dedicated notification; examiner notes that there is a dedicated notification thread for each deferred procedure call, therefore, each DPC is assigned to a notification thread of Chen] of the number of threads [multithreaded applications, p. 3, Section 3.2 of Chen; examiner notes that multithreaded applications allows multiple threads to execute concurrently; Chen also teaches multiprogramming environment, which allows multiple operations to take place, p. 2, Section 2 of Chen].

10. As to claim 18, Asselin as modified teaches at least one of the first and second interrupt events comprises a software interrupt [NT event; p. 3, Section 3.2 of Chen].

11. As to claim 19, Asselin teaches at least one peripheral device, the interrupt events associated with the at least one peripheral device [col. 5, lines 9 – 49].

12. As to claims 20, 25 and 26, these are system claims that correspond to method claims 1, 6 and 7; note the rejections to claims 1, 6 and 7 above, which also meet these system claims.

13. As to claims 31 and 35, Asselin teaches the source comprises a peripheral device of a computer system [col. 5, lines 9 – 49].

Conclusion

14. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

CONTACT INFORMATION

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Li B. Zhen whose telephone number is (571) 272-3768. The examiner can normally be reached on Mon - Fri, 8:30am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, William Thomson can be reached on 571-272-3718. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Li B. Zhen
Examiner
Art Unit 2194

LBZ


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